WASHINGTON STATE DEPARTMENT OF ECOLOGY

December 2009 (Updated January 2011)

PILOT USE LEVEL DESIGNATION FOR BASIC TREATMENT

For

Royal Environmental Systems, Inc. ecoStorm plus

Ecology's Decision:

Based on Royal Environmental's application submissions and recommendations by the Technical Review Committee (TRC), Ecology hereby issues a pilot use level designation (PLD) for the ecoStorm plus filter system:

- **As a basic stormwater treatment device for total suspended solids (TSS) removal,**
- **Using the Standard concrete filter,**
- **Sized at a design rate of 360 GPM per filter (19.6 ft² surface area).**

The Use Level Designation expires on June 1, 2013 unless extended by Ecology, and is subject to the conditions specified below.

Ecology's Conditions of Use:

ecoStorm plus units shall be designed, installed, and maintained to comply with these conditions:

1. **ecoStorm plus units must be designed, assembled, installed, operated, and maintained in accordance with Royal Environmental Systems Inc.'s applicable manuals and documents and the Ecology Decision.**

2. **ecoStorm plus units using the Standard concrete filter are approved for treatment at 360 GPM maximum flow rate per filter at the 15-minute water quality design flow rate (as specified in Ecology's most recent Stormwater Manual), as calculated using the latest version of the Western Washington Hydrology Model or other Ecology-approved continuous runoff model. Note that if single event methods are used to estimate runoff flowrates, Figures 9.6a and 9.6b of the 2005 Stormwater Management Manual for Western Washington should be used to adjust the approved hydraulic loading rate of 360 GPM. This is done by multiplying the above hydraulic loading rate by the ratio indicated in Figure 9.6a for on-line designs, or Figure 9.6b for off-line designs. The 6-month, 24-hour rainfall amount for the project site must be known to identify the**

appropriate ratio. The adjusted hydraulic loading rate is divided into the peak 10-minute flowrate predicted by the single event method to compute the number of cartridges necessary.

3. **Royal Environmental Systems Inc. commits to submitting a QAPP for TRC review and Ecology approval by June 1, 2011 that meets the TAPE requirements for attaining a GULD for Basic Treatment. Additional QAPPs must be reviewed and approved by the TRC and Ecology for each field site in Washington State. The sites chosen should be reflective of the product's treatment intent.**

4. **Local jurisdictions must file a "Pilot Level Technologies Notice of Intent" form with the Department of Ecology prior to authorizing ecoStorm plus for a Pilot Use Level application.**

5. **Royal Environmental Systems Inc. shall complete all required testing and submit a TER for Ecology review by December 1, 2012.**

6. **Royal Environmental Systems Inc. may request Ecology to grant deadline or expiration date extensions, upon showing cause for such extensions.**

7. **Discharges from the ecoStorm plus units shall not cause or contribute to water quality standards violations in receiving waters.**

Applicant: Royal Environmental Systems Inc.

Applicant's Address: 30622 Forest Blvd, PO Box 430
Stacy, MN, 55079

Application Documents:

- Product Information for Washington State Department of Ecology Use Designation Determination, prepared by Water Tectonics (July 2006)

- ecoStorm plus Lab Scale Testing Final Report, prepared by Water Tectonics (July 2006)

- Report on investigations into retention of pollutants in rainfall runoff from a concrete plant using a ecoStorm plus filter pit prepared by: Dr. Dierkes (August 2004)

Applicant's Use Level Request:

Pilot Use Designation as a Basic Treatment device in accordance with Ecology's 2005 Western Washington Stormwater Manual.

Applicant's Performance Claims:

- Average of 80% removal of TSS using Sil-Co-Sil 106 as a laboratory stimulant.

Technical Review Committee's Recommendations:

The TRC finds that:

- Royal Environmental Systems Inc. should be given the opportunity to demonstrate, through additional laboratory and field testing, whether the ecoStorm Plus filter system can attain Ecology's Basic Treatment goals.

Findings of Fact:

- Based on laboratory testing of a scaled down unit (0.784 ft^2 of filter media), at a flowrate of 7 GPM per filter, the ecoStorm Plus filter system has been shown to have a total suspended solids removal efficiency of 81% using Sil-Co-Sil 106 with an average influent concentration of 100 mg/L and zero initial sediment loading.

- Based on laboratory testing of a scaled down unit (0.784 ft^2 of filter media), at a flowrate of 14 GPM per filter, the ecoStorm Plus filter system has been shown to have a total suspended solids removal efficiency of 78% using Sil-Co-Sil 106 with an average influent concentration of 200 mg/L and zero initial sediment loading.

Other ecoStorm plus Related Issues to be Addressed By the Company:

1. No complete field test results are available, so it is unknown whether the ecoStorm plus filter system can reliably attain 80% removal of the finer particles comprising TSS found on local highways, parking lots, and other high-use areas at the design operating rate. Royal Environmental Systems Inc. should test a variety of operating rates to establish conservative design rates. Pollutant loading capacities of and breakthrough data on the filter media should also be determined to better predict maintenance cycles.

2. The system should be tested under normal operating conditions, such that the settling basin is partially filled with pollutants. Results obtained for "clean" systems may not be representative of typical performance.

3. Field testing should be conducted at sites that are indicative of the treatment goals.

4. Testing should be conducted to obtain information about maintenance requirements in order to come up with a maintenance cycle.

5. Testing should be conducted to determine if oils and grease affect the treatment ability of the concrete filter. This should include a determination of how oil and grease may affect the ion-exchange capacity of the system if claims are to be made for metals and phosphorus removal.

6. Loading tests should be conducted on the filter to determine maximum treatment life of the system.

Technology Description: Download at www.royalenterprises.net

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Ecology web link: http://www.ecy.wa.gov/programs/wq/stormwater/newtech/index.html

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